QUARTERLY STATUS REPORT

NASA Request Number R 10-009-013

Conduct ground investigations of flight experiments on primates in long duration zero-g

UNPUBLISHED PRELIMINARY DATA

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by

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Period Covered

September 1, 1964 to November 30, 1964

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The investigations are carried out at the Research Laboratory of the U. S. Naval School of Aviation Medicine, Pensacola, Florida, and by subcontract issued on November 2, 1964 by the U. S. Navy Purchasing Office, Washington Navy Yard, to Ling-Temco-Vought, Inc., LTV Astronautics Division, Dallas, Texas (Contract No. N600(203) 63019). The first quarterly report by LTV is due on March 15, 1965. For this reason the present communication reports only on experiments performed in Pensacola.

These experiments represent a continuation of work previously performed under the terminated NASA Order Number A-34681 (issued by Ames Research Center, Moffett Field, California). Work during the report period was concerned in its main part with zero g exposure of monkeys and rats in Keplerian trajectory jet flights at Wright-Patterson Air Force Base. The flights (about 250 parabolas) were executed during the time period October 19 to October 23, 1964 and were extremely successful. Still and motion pictures of the animals in a Plexiglas cage and free-floating in the airplane cabin were taken. In addition, the monkeys were trained to work on an intermittent, food-reinforced schedule. Samples of their response rates were recorded for 30-second control periods before, during, and after the weightless period. Normal as well as labyrinthectomized monkeys served as subjects.

Initially, the response of the normal monkeys was suppressed to just 6 per cent of their normal rate while that of the labyrinthectomized animals dropped only to 73 per cent of their normal rate. Adaptation individually and group-wise

proceeded irregularly, with the normals recovering to a final response rate of 78 per cent, and the labyrinthectomized animals' rate being further suppressed to 52 per cent of their normal rate. Analysis of films revealed striking adjustment of some animals to free-floating. Adaptation was obviously incomplete in the time range encompassed, and specific to each situation.

Dr. Khalil (MD and PhD), who joined our group during the reporting period, worked on a most interesting method to measure the cardiac output of squirrel monkeys by a principle based on thermodilution. This method which can be used with telemetry equipment allows repeated rapid determination of cardiac output on a continual basis both at rest and during exercise. The method is in a number of respects superior to the dye dilution method and is recommended for monitoring of animals in space.

Experiments with liquid low residue diet are conducted under supervision of a veterinarian. Experience with low residue diet is of great importance for the success of the long duration experiment where waste problems may be a limiting factor.